Date: July 12, 2012

Subject: Microbiology Data Validation (Dimock – May, 2012)

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**Overview**

The sample set reviewed consists of 7 samples (including two field blanks) that were analyzed by Microbac Laboratories, Inc., for the following parameters:

| Parameter | Analytical Method |
|---|---|
| Total Coliforms | SM 9223B Colilert |
| *E. coli* | SM 9223B Colilert |
| Heterotrophic Bacteria Count | SM 9215B (R2A agar) |

Results for total coliform and *E. coli* using method SM 9223B Colilert were reported using the wrong units, CFU (Colony Forming Units) /100 mL. The correct units for the method are MPN (Most Probable Number) / 100 mL.

Data quality was reviewed based on criteria set forth in *Standard Methods for the Examination of Water and Wastewater*, 20th Edition, and the *USEPA Manual for the Certification of Laboratories Analyzing Drinking Water*, 5th Edition, *Chapter 5 – Critical Elements for Microbiology*. Data quality problems are listed below.

**Summary**

There are several data quality issues associated with the data. The total coliform (TC) and *E. coli* (EC) results for three of the seven samples contain no problems at all. The results for four samples may be biased high although the detections are acceptable. Heterotrophic plate count (HPC) data for all seven samples has multiple quality issues and HPC data from three samples is rejected. Data issues are identified below and qualifications for all analyses are provided in Table 1 under Conclusions.

**Data Quality Issues**

1. TC/EC and HPC Transport Temperatures: For TC and EC, and HPC, the cooler transport temperature was in compliance with the <10°C requirement for 3 of the 7 samples. For the other four samples, the transport temperature was not documented on the COC. Without documentation of the required temperature, it is not known whether or not samples were adequately cooled during transport. Therefore, any quantitative results from the samples shaded in grey below may be biased high.

| | | | |
|---|---|---|---|
| FB22 | HW62 | HW63z | HW64-P |
| FB23 | HW63 | HW64 | |

2. HPC Holding Times: Although the 30-hour holding time for total coliforms and *E. coli* was met for all samples, the 8-hour holding time for HPC was exceeded for seven of seven samples (shaded below) and varied from 24 to 28.5 hours. Depending on other water quality factors an extended holding time may

cause the number of bacteria present to increase, decrease, or remain unchanged. Results therefore may be biased high or low, or be unaffected.

| | | | |
|---|---|---|---|
| FB22 | HW62 | HW63z | HW64-P |
| FB23 | HW63 | HW64 | |

3. HPC Duplicate Plates: Method SM9215B requires that "at least duplicate plates" be prepared for each dilution analyzed and an average plate count reported. Duplicate HPC plates were not done for each sample, nor for each dilution. In three cases it appears that duplicate plates were prepared as a quality control sample ("DUP1") for a batch of samples. For the purpose of this review the "DUP1" plates may serve as duplicate plates for three samples (FB22, FB23, and HW62). Unfortunately, for HW62 the count from the plate that is hereby designated as a "duplicate" plate was not averaged with the sample HPC count. Result is the same as if no duplicate plate had been prepared. Analyses done without duplicate plates (i.e., done with single plates only) are less accurate and are shaded below.

| | | | |
|---|---|---|---|
| FB22 | HW62 | HW63z | HW64-P |
| FB23 | HW63 | HW64 | |

4. HPC Method Blanks: A method blank (or R2A agar sterility control plate identified on each "Microbiology Preparation Batch Sheet" as "BLK1") was poured and evaluated for each batch of samples plated. One such method blank was prepared with a batch of three samples on 5/23/12 and proved to be contaminated. Consequently, the results obtained from those three samples (shaded in grey below) must be rejected due to the possibility of contamination. See EPA's SDWA Lab Manual, paragraph 5.5.12.

| | | | |
|---|---|---|---|
| FB22 | HW62 | HW63z | HW64-P |
| FB23 | HW63 | HW64 | |

**Conclusions**

Table 1 presents the final data qualifications for May, 2012, microbiology samples. The number in parentheses corresponds to the data quality issue discussed above. If results are rejected ( R ), no other qualifiers are presented.

Table 1. Data Qualifiers

| SAMPLE | QUALIFIERS for TC/EC DATA | QUALIFIERS for HPC DATA |
|---|---|---|
| FB22 | K(1) | R(4) |
| FB23 | | J(2) |
| HW62 | K(1) | J(2,3), K(1) |
| HW63 | | J(2,3) |
| HW63z | | J(2,3) |
| HW64 | K(1) | R(4) |
| HW64-P | K(1) | R(4) |